Alberta Energy Regulator

Directive 082

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Operating Criteria: Resource Recovery Requirements for Oil Sands Mine and Processing Plant Operations

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1 Introduction

1.1 Purpose of This Directive

This directive identifies the operating criteria used by the Alberta Energy Regulator (AER) to identify the oil sands that an operator is required to mine as part of its operation and specifies the volume of bitumen that an operator is required to recover from its mining and processing operations.

These criteria allow industry greater operational flexibility, while at the same time fulfilling the AER's mandate "to effect conservation and prevent waste of the oil sands resources."[1] Although the criteria define minimum requirements, industry has committed to a program of continuous improvement.

This directive applies to all oil sands mine and processing plant operations.

1.2 What's New in This Edition

In this edition of *Directive 082*, all references to *Directive 019: Compliance Assurance*, which has been rescinded, and related information have been removed.

1.3 AER Requirements

Following AER requirements is mandatory for the responsible duty holder, as specified in legislation (e.g., licensee, operator, company, applicant, approval holder, or permit holder). The term "must" indicates a requirement, while terms such as "recommends" and "expects" indicate a recommended practice.

Each AER requirement is numbered.

Information on compliance and enforcement can be found on the AER website.

2 Bitumen Recovery

Four criteria will be used together to establish the volume of bitumen that an operator is required to recover each year from its mining and processing operations. The criteria will not be enforced individually. The criteria are as follows:

- The **in situ oil sands cutoff grade** is defined as the minimum bitumen content of the oil sands that would be classified as ore. It has been set at 7 weight per cent bitumen.
- The **minimum mining thickness (mining selectivity)** is defined as the minimum thickness of ore that can be separated from waste or waste that can be separated from ore. It has been set at 3 metres (m).

[1] *Oil Sands Conservation Act*, section 3(a)

- The **ratio of cutoff total volume to bitumen in place (TV/BIP)**[2] is defined as the minimum value for TV/BIP that would be used to determine the pit crest limits. It has been set at 12.
- **Processing plant recovery** is a variable factor based on the average bitumen content of the as-mined ore.[3] The factor is determined as follows:
  - If the average bitumen content of the as-mined ore is 11 weight per cent bitumen or greater, the recovery factor is 90 weight per cent.
  - If the average bitumen content of the as-mined ore is less than 11 weight per cent bitumen, recovery is determined by the following equation, where x is the average weight per cent bitumen content of the as-mined ore:

$$\text{Recovery} = -202.7 + 54.1(x) - 2.5(x^2)$$

The AER will conduct an annual compliance review and calculate the volume of bitumen an operator is required to recover using the above four criteria and other data provided by the operator.

1) Each calendar year, an operator must recover the volume of bitumen from its mining and processing operations that is equal to or greater than the volume of bitumen calculated by the AER and reported to Petrinex.
2) To ensure accuracy, an operator must submit to the AER its nonlicensed drillhole data.
3) An operator must provide quality mine survey data to allow the total volume of material mined during the reporting period to be calculated to within an accuracy of 1 per cent.

It is critical to the success of operating criteria that each operator have in place an appropriate system to measure and report on its actual bitumen recovery for comparison against the calculated recovery. As stated in the *Oil Sands Conservation Rules*, it is an operator's responsibility to demonstrate to the satisfaction of the AER that it has the necessary measurement and reporting systems in place.

3 Sterilization

The AER will use these operating criteria to identify the oil sands that an operator must mine from a given project area. It will also use these criteria to identify oil sands that may be affected by a proposed development but are outside the project area.

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[2] TV/BIP = (Ore Volume + Interburden Volume + Overburden Volume) ÷ (Volume of Bitumen in Place) where ore, interburden, and overburden volumes are in bank cubic metres and bitumen in place is in cubic metres and refers to the volume of bitumen in zones passing the minimum mining thickness and cutoff grade criteria.

[3] A 0.5 m swap thickness at the base of each ore or waste zone will be allowed for to account for the impact of dilution/reduction on in situ grade and to convert "ore" to "as-mined ore."

Any action of an operator that results or tends to result in a reduction in the volume of oil sands mined (as identified by operating criteria) may be a case of sterilization. Such actions could include the location of permanent surface facilities on oil sands, bypassing oil sands located outside the mine site, or bypassing oil sands within the mine site.

While the AER recognizes that some oil sands may be sterilized due to valid environmental, technical, economic, or operational reasons, it is the AER's objective to minimize such sterilization.

4) An operator must apply to the AER for an approval in all cases of potential sterilization.

Any economic evaluation submitted in support of an application will be based on the principles previously established under Resource Recovery Economics.[4] Each application for sterilization will be subject to a detailed review by the AER, and the AER may approve or deny the application.

4 Annual Mine Plan

Pursuant to section 30 of the *Oil Sands Conservation Rules*, an operator must submit to the AER, for its approval, details of its annual mine plan for the next calendar year of operation. This is required in order for the AER to maintain an awareness of development activity, identify potential issues that may affect resource recovery, and address areas of uncertainty that may be identified at the time of an application.

5) An operator must submit its annual drilling plan for approval.

Submission of the drilling plan will provide the AER with a better opportunity to assess resource recovery issues such as the establishment of final pit limits and the impacts of out-of-pit developments on resource recovery. If the AER is of the opinion that the proposed drilling plan will not provide sufficient high-quality geological data to determine an operator's compliance with bitumen recovery requirements, the AER will identify the deficient areas and will require that the operator address them through additional drilling.

Drilling requirements for ongoing operations may be specified by the AER on a case-by-case basis.

5 Drilling Requirements

The following drilling requirements allow the AER to evaluate an application for a new mine or processing plant site or an extension in project area at an approved mine or processing plant site. The AER may consider requests by an applicant to vary the drilling requirements if the applicant demonstrates that circumstances warrant. However, to minimize the risk of the application being declared incomplete on the basis of inadequate drilling data, it is the applicant's responsibility to

[4] As per letter to industry from the Energy Resources Conservation Board (predecessor to the AER) dated August 28, 2000.

meet with the AER well in advance of filing an application if it intends to request any variance in drilling requirements.

5.1 Drilling Data Quality

6) All new drilling must contain a suite of quality resistivity, gamma, and density logs; quality-controlled Dean/Stark core analysis; no more than 15 per cent evenly distributed lost core within the bitumen-bearing zone; and identifiable McMurray Formation top and base markers.

7) Older drilling results contain various qualities and combinations of the above information over all or portions of the McMurray Formation. Each of these older drillholes must have no more than 20 per cent evenly distributed lost core within the complete McMurray Formation and quality-controlled Dean/Stark core analysis.

Drillholes whose analysis coverage and quality is suspect and log-only results are not accepted unless an applicant justifies their inclusion.

5.2 Drilling Density

8) An applicant must delineate the bitumen resource base under the mine and processing plant sites in accordance with the following:

   a) For all areas subject to development within the first ten years and for a 1 kilometre (km) buffer around these areas, the maximum spacing between drillholes meeting the drilling data quality requirements must be 350 m as determined by triangulation. If any one side of the triangle is greater than 350 m, the AER will determine if additional drilling is required.

   b) For all other areas subject to development after the first ten years and for a 1 km buffer around these areas, the maximum spacing between drillholes meeting the drilling data quality requirements must be 700 m as determined by triangulation. If any one side of the triangle is greater than 700 m, the AER will determine if additional drilling is required.